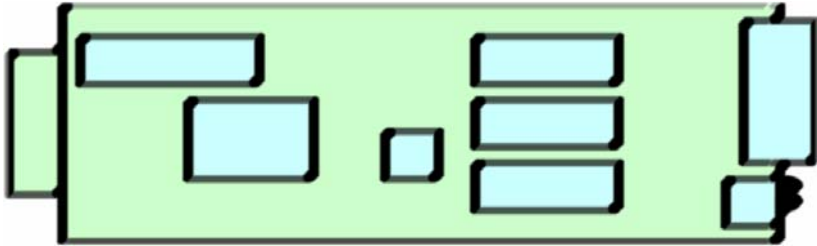


MODBUS Communication Card

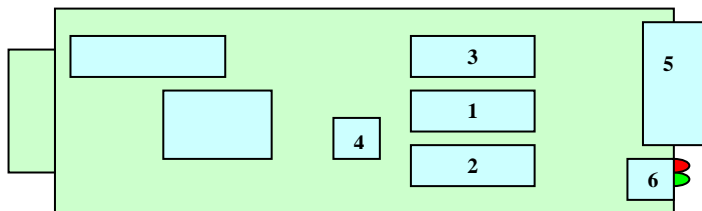


User Manual



1 Presentation

1.1 Overview



1. MODBUS Card ID configuration switch
2. RS-232 Port configuration switch
3. RS-422/485 Port configuration switch
4. RS-422/485 selection switch
5. RS-422/485 and RS-232 communication port
6. Diagnostic LEDs

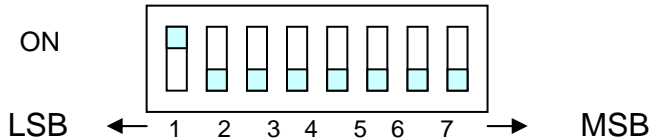
1.2 Function

- Provide UPS the functionality of communication with PC through MODBUS protocol
- Implementation of MODBUS RTU protocol
- Provide MODBUS function including Read Coils/Discrete Inputs/Holding Registers/Input Registers and Write Single Coil/Single Register
- Provide RS-422/485 and RS-232 interfaces. PC can communicate with UPS through RS-422/485 or RS-232 or both simultaneously.
- Provide alarm LEDs, users can tell communication status quickly.
- Except MODBUS protocol, also support 3Phase/Regular Protocols. Users can select communication protocol through function switches.
- Provide firmware upgrade functionality through RS-232 port.

2 Installation

2.1 ID Configuration of MODBUS Card

- Users can set card ID value from 0 to 255 through SW1.



As above setting, card ID will be 1.

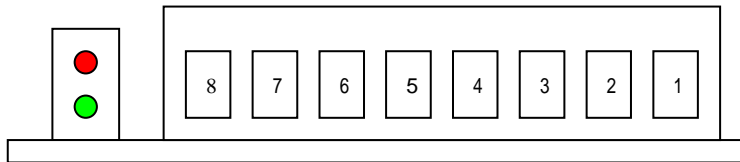
- ID Configuration

| Protocol | Function | |
|----------|---------------------------|-----------------------------|
| MODBUS | Card ID is equal to 0 | Use UPS ID to get UPS Info |
| | Card ID is not equal to 0 | Use Card ID to get UPS Info |
| 3Phase | Card ID is equal to 0 | Use UPS ID to get UPS Info |
| | Card ID is not equal to 0 | Use Card ID to get UPS Info |
| Regular | Card ID is equal to 0 | Use UPS ID to get UPS Info |
| | Card ID is not equal to 0 | Use Card ID to get UPS Info |

2.2 Configuration of RS-232 Port

- Use SW2 to configure RS-232 interface.
- Pin-out

CN3



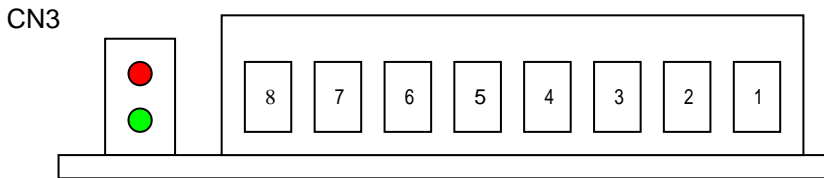
| Pin | Function |
|-----|---------------------------------|
| 6 | Card TxD – transfer data to PC |
| 7 | Card RxD – receive data from PC |
| 8 | GND |

- RS-232 Port Configuration

| Function | Switch | | Value |
|--------------|--------|----------|----------------------|
| Baud-rate | SW2-1 | SW2-2 | |
| | OFF | OFF | 2400 |
| | ON | OFF | 4800 |
| | OFF | ON | 9600 |
| | ON | ON | 19200 |
| Parity Check | SW2-3 | OFF | Disable Parity Check |
| | | ON | Enable Parity Check |
| | SW2-4 | OFF | Even Parity |
| | | ON | Odd Parity |
| Protocol | SW2-5 | SW2-6 | |
| | OFF | OFF | MODBUS Protocol |
| | ON | OFF | Regular Protocol |
| | OFF | ON | 3Phase Protocol |
| | SW2-7 | Reserved | |
| | SW2-8 | Reserved | |

2.3 Configuration of RS-422/485 Port

- Use SW3 to configure RS-422/485 interface
- Pin-out



| Pin | Function |
|-----|-------------|
| 1 | Card D+(T+) |
| 2 | Card D-(T-) |
| 3 | Card R+ |
| 4 | Card R- |

- RS-485/RS-422 Selection

| Switch | Setting | Function |
|--------|---------|---------------|
| SW4 | RS485 | Enable RS-485 |
| | RS422 | Enable RS-422 |

- RS-422/485 Port Configuration

| Function | Switch | | Value |
|--------------|--------|-------|----------------------|
| Baud-rate | SW3-1 | SW3-2 | |
| | OFF | OFF | 2400 |
| | ON | OFF | 4800 |
| | OFF | ON | 9600 |
| | ON | ON | 19200 |
| Parity Check | SW3-3 | OFF | Disable Parity Check |
| | | ON | Enable Parity Check |
| | SW3-4 | OFF | Even Parity |
| | | ON | Odd Parity |
| Protocol | SW3-5 | SW3-6 | |

| | | | |
|----------------------|-------|-----|---|
| | OFF | OFF | MODBUS Protocol |
| | ON | OFF | Regular Protocol |
| | OFF | ON | 3Phase Protocol |
| Termination Resistor | SW3-7 | OFF | Disable RS-485/422 Termination Resistor |
| | | ON | Enable RS-485/422 Termination Resistor |
| | SW3-8 | OFF | Disable RS-422 Termination Resistor |
| | | ON | Enable RS-422 Termination Resistor |

2.4 LED Indicator

| LED | Status | Description |
|-----------|--------------------|-------------------------|
| Red LED | Dark | UPS is disconnected |
| | Flashing(1 second) | UPS is connected |
| Green LED | Light 0.2 second | When receive PC request |

3 Operation

3.1 Discrete Inputs (Range 0x0100 – 0x012F, Read Function 0x02)

| Description | Address | Value 0 | Value 1 |
|------------------------|---------|-----------|------------------|
| Alarm Temperature | 0x0100 | OK | Over Temperature |
| Alarm Input Bad | 0x0101 | OK | Input Bad |
| Alarm Output Bad | 0x0102 | OK | Output Bad |
| Alarm Overload | 0x0103 | OK | Overload |
| Alarm Bypass Bad | 0x0104 | OK | Bypass Bad |
| Alarm Output Off | 0x0105 | Output On | Output Off |
| Alarm UPS Shutdown | 0x0106 | OK | Shutdown |
| Alarm Charger Failure | 0x0107 | OK | Charger Failure |
| Alarm System Off | 0x0108 | System On | System Off |
| Alarm Fan Failure | 0x0109 | OK | Fan Failure |
| Alarm Fuse Failure | 0x010A | OK | Fuse Failure |
| Alarm General Fault | 0x010B | OK | General Fault |
| Alarm Awaiting Power | 0x010C | OK | Awaiting Power |
| Alarm Shutdown Pending | 0x010D | OK | Shutdown Pending |

| | | | |
|-------------------------------------|--------|---------|-------------------------------|
| Alarm Shutdown Imminent | 0x010E | OK | Shutdown Imminent |
| Buzzer Status | 0x010F | Silence | Alarm |
| Economic Mode | 0x0110 | No | Yes |
| Alarm Inverter Bad | 0x0111 | OK | Inverter Bad |
| Emergency Power Off | 0x0112 | Off | On |
| Buzzer State | 0x0113 | Disable | Enable |
| Battery Ground Fault | 0x0114 | OK | Battery Ground Fault |
| Reserved | 0x0115 | | |
| Reserved | 0x0116 | | |
| Reserved | 0x0117 | | |
| Alarm Rectifier Main Fail | 0x0118 | OK | Rectifier Main Fail |
| Alarm Rectifier Hi DC Stop | 0x0119 | OK | Rectifier Hi DC Stop |
| Alarm Over Temperature or Fuse Fail | 0x011A | OK | Over Temperature or Fuse Fail |
| Alarm Battery Low | 0x011B | OK | Battery Low |
| Alarm Battery Low Stop | 0x011C | OK | Battery Low Stop |
| Alarm Battery Ground Fault | 0x011D | OK | Battery Ground Fault |

| | | | |
|---------------------------------|--------|-----------------------|---------------------------|
| Inverter ON | 0x011E | Inverter OFF | Inverter ON |
| Alarm Inverter Overload | 0x011F | OK | Inverter Overload |
| Alarm Inverter Abnormal | 0x0120 | OK | Inverter Abnormal |
| Alarm Load On Reserve | 0x0121 | Load Not On Reserve | Load On Reserve |
| Alarm Reserve Mains Fail | 0x0122 | OK | Reserve Mains Fail |
| Alarm Reserve Freq. Abnormal | 0x0123 | OK | Reserve Freq. Abnormal |
| Alarm Test In Progress | 0x0124 | No Test In Progress | Test In Progress |
| Alarm Test Error | 0x0125 | No Test Error | Test Error |
| UPS In Sleep Mode | 0x0126 | UPS Not In Sleep Mode | UPS In Sleep Mode |
| Reserved | 0x0127 | | |
| Alarm Bypass Volt/Freq. Bad | 0x0128 | OK | Bypass Volt/Freq. Bad |
| Alarm Bypass Phase Sequence Bad | 0x0129 | OK | Bypass Phase Sequence Bad |
| Alarm Bypass STS Overload | 0x012A | OK | Bypass STS Overload |

| | | | |
|-----------------------------------|--------|----|-----------------------------|
| Alarm Bypass STS Over Temperature | 0x012B | OK | Bypass STS Over Temperature |
| Alarm Bypass STS Fault | 0x012C | OK | Bypass STS Fault |
| Reserved | 0x012D | | |
| Reserved | 0x012E | | |
| Reserved | 0x012F | | |

Remark:

1. UPS may not support all of fields

3.2 Coils(Range 0x0200 – 0x020F, Read Function 0x01, Write Function 0x05)

| Description | Address | Value 0 | Value 1 |
|-------------------------------|---------|------------|------------|
| UPS Buzzer | 0x0200 | Silence | Alarm |
| Shutdown Type | 0x0201 | UPS Output | UPS System |
| Economic Mode Setting | 0x0202 | Disable | Enable |
| ATX PC Reboot Function | 0x0203 | Disable | Enable |
| AC Fail & Restore Auto-Reboot | 0x0204 | Disable | Enable |

| | | | |
|-------------------------|--------|-------------------------|-------------------------|
| ATX PC Resume Function | 0x0205 | Disable | Enable |
| Enable/Disable Buzzer | 0x0206 | Disable | Enable |
| EPO Setting | 0x0207 | Disable | Enable |
| Enable/Disable Inverter | 0x0208 | Disable | Enable |
| Clear SRAM | 0x0209 | Clear SRAM | Clear SRAM |
| Cancel Shutdown Restart | 0x020A | Cancel Shutdown Restart | Cancel Shutdown Restart |
| Set Output On/Off | 0x020B | OFF | ON |
| Reserved | 0x020C | | |
| Reserved | 0x020D | | |
| Reserved | 0x020E | | |
| Reserved | 0x020F | | |

Remark:

UPS may not support all of fields

3.3 Holding Register(Range 0x0300 – 0x0321, Read Function 0x03, Write Function 0x06)

| Description | Address | Value | Unit |
|----------------------------------|---------|---|---------|
| Shutdown Action | 0x0300 | 0 – 9999(0=Abort) | Seconds |
| Shutdown Restart | 0x0301 | 0 – 65535 | Minutes |
| Test | 0x0302 | 0 : Abort Test 1 : General Test 2 : BTV Test 3 : Test for 10 seconds 4 : Test until battery low | |
| UPS Identification | 0x0303 | 0 – 99 | |
| Low Transfer Voltage | 0x0304 | 0 – 999 | Voltage |
| High Transfer Voltage | 0x0305 | 0 – 999 | Voltage |
| Voltage Sensitivity | 0x0306 | 0 : Normal 1 : Reduced 2 : Low | |
| Last Battery Replace Date - Year | 0x0307 | 0 – 9999 | |

| | | | |
|-----------------------------------|--------|--|---------|
| Last Battery Replace Date - Month | 0x0308 | 1 - 12 | |
| Last Battery Replace Date - Day | 0x0309 | 1 - 31 | |
| Next Battery Replace Date - Year | 0x030A | 0 – 9999 | |
| Next Battery Replace Date - Month | 0x030B | 1 - 12 | |
| Next Battery Replace Date - Day | 0x030C | 1 - 31 | |
| UPS Periodic Auto-Test | 0x030D | 1 : Disable 2 : Daily 3 : Weekly 4 : Bi-Weekly 5 : Monthly | |
| Buzzer Test | 0x030E | 1 – 99 | Seconds |
| UPS Boot Delay | 0x030F | 0 – 999 | Seconds |
| Bypass Freq. Tolerance | 0x0310 | 5 – 50 | 0.1Hz |
| Select Output Voltage | 0x0311 | 0 – 999 | Voltage |
| Test Time | 0x0312 | 1 – 60 | Minutes |
| Test Voltage | 0x0313 | 0 – 999 | Voltage |
| Reserved | 0x0314 | | |

| | | | |
|------------------------------|--------|---------|---------|
| Reserved | 0x0315 | | |
| External Battery Pack | 0x0316 | 0 - 10 | |
| Dry Contact W1 | 0x0317 | | |
| Dry Contact W2 | 0x0318 | | |
| Dry Contact W3 | 0x0319 | | |
| Dry Contact W4 | 0x031A | | |
| Dry Contact W5 | 0x031B | | |
| Dry Contact W6 | 0x031C | | |
| Bypass Low Transfer Voltage | 0x031D | 0 - 999 | Voltage |
| Bypass High Transfer Voltage | 0x031E | 0 - 999 | Voltage |
| Bypass Voltage Tolerance | 0x031F | 0 - 999 | Voltage |
| Dry Contact Input Status 1 | 0x0320 | | |
| Dry Contact Input Status 2 | 0x0321 | | |

Remark:

UPS may not support all of fields

3.4 Input Register(Range 0x0400 – 0x051C, Read Function 0x04) Rating Value

| Description | Address | Value | Unit |
|----------------------------|---------|--------------------------------|---------|
| Series | 0x0400 | 0: T 1: H 2: NT 3: NH | |
| Rating Input Voltage | 0x0401 | 0 – 999 | Voltage |
| Rating Input Frequency | 0x0402 | 0 – 999 | 0.1Hz |
| Rating Output Voltage | 0x0403 | 0 – 999 | Voltage |
| Rating Output Frequency | 0x0404 | 0 – 999 | 0.1Hz |
| Rating VA | 0x0405 | 0 – 65534 | 10 VA |
| Rating Output Power | 0x0406 | 0 – 65534 | 10 Watt |
| Low Battery Time | 0x0407 | 0 – 99 | Minutes |
| Low Tx Voltage Point | 0x0408 | 0 – 999 | Voltage |
| High Tx Voltage Point | 0x0409 | 0 – 999 | Voltage |
| Low Tx Voltage Upper Bound | 0x040A | 0 – 999 | Voltage |

| | | | |
|---|--------|--|---------|
| Low Tx Voltage Lower Bound | 0x040B | 0 – 999 | Voltage |
| High Tx Voltage Upper Bound | 0x040C | 0 – 999 | Voltage |
| High Tx Voltage Lower Bound | 0x040D | 0 – 999 | Voltage |
| UPS Type | 0x040E | 0 : On-Line 1 : Off-Line 2 : Line-Interactive 3 : 3Phase 4 : Split Phase 5 : Others | |
| Rating Battery Voltage | 0x040F | 0 – 999 | Voltage |
| Low Tx Frequency Point | 0x0410 | 0 – 999 | 0.1Hz |
| High Tx Frequency Point | 0x0411 | 0 – 999 | 0.1Hz |
| Bypass Rating Frequency | 0x0412 | 0 – 999 | 0.1Hz |
| Bypass Freq. Max Tolerance | 0x0413 | 5 – 50 | 0.1Hz |
| Bypass Freq. Set Tolerance | 0x0414 | 5 – 50 | 0.1Hz |
| Bypass Low Tx Voltage Point/Bypass Rating Voltage | 0x0415 | 0 – 999 | Voltage |

| | | | |
|--|--------|---------|---------|
| Bypass High Tx Voltage Point | 0x0416 | 0 – 999 | Voltage |
| Bypass Low Tx Voltage Upper Bound/Bypass Voltage Max Tolerance | 0x0417 | 0 – 999 | Voltage |
| Bypass Low Tx Voltage Lower Bound/Bypass Voltage Set Tolerance | 0x0418 | 0 – 999 | Voltage |
| Bypass High Tx Voltage Upper Bound | 0x0419 | 0 – 999 | Voltage |
| Bypass High Tx Voltage Lower Bound | 0x041A | 0 – 999 | Voltage |
| Reserved | 0x041B | | |
| Reserved | 0x041C | | |
| Reserved | 0x041D | | |

Battery Status

| Description | Address | Value | Unit |
|-----------------------------|---------|--|------------|
| Battery Condition | 0x041E | 0 : Good 1 : Weak 2 : Replace | |
| Battery Status | 0x041F | 0 : OK 1 : Low 2 : Depleted | |
| Battery Charge | 0x0420 | 0 : Floating 1 : Charging 2 : Resting 3 : Discharging | |
| Seconds On Battery | 0x0421 | 0 – 65534 | Seconds |
| Estimated Minutes Remaining | 0x0422 | 0 – 9999 | |
| Estimated Charge Remaining | 0x0423 | 0 – 999 | |
| Battery Voltage | 0x0424 | 0 – 9999 | 0.1Voltage |
| Battery Current | 0x0425 | 0 – 9999 | 0.1Amp |

| | | | |
|------------------------------|--------|----------|----------------|
| Temperature | 0x0426 | 0 – 999 | Degree Celsius |
| Battery Level | 0x0427 | 0 – 999 | % |
| External Battery Pack # | 0x0428 | 0 - 10 | |
| Negative Battery Voltage | 0x0429 | 0 – 9999 | 0.1Voltage |
| Negative Battery Current | 0x042A | 0 – 9999 | 0.1Amp |
| Negative Battery Temperature | 0x042B | 0 – 999 | Degree Celsius |
| Negative Battery Level | 0x042C | 0 – 999 | % |
| Reserved | 0x042D | | |
| Reserved | 0x042E | | |
| Reserved | 0x042F | | |

Input Status

| Description | Address | Value | Unit |
|--------------------|---------|----------|------------|
| Input Number Lines | 0x0430 | 0 – 9 | |
| Input Frequency 1 | 0x0431 | 0 – 999 | 0.1Hz |
| Input Voltage 1 | 0x0432 | 0 – 9999 | 0.1Voltage |
| Input Current 1 | 0x0433 | 0 – 9999 | 0.1Amp |

| | | | |
|-------------------|--------|-----------|------------|
| Input Power 1 | 0x0434 | 0 – 65534 | 10 Watt |
| Input Frequency 2 | 0x0435 | 0 – 999 | 0.1Hz |
| Input Voltage 2 | 0x0436 | 0 – 9999 | 0.1Voltage |
| Input Current 2 | 0x0437 | 0 – 9999 | 0.1Amp |
| Input Power 2 | 0x0438 | 0 – 65534 | 10 Watt |
| Input Frequency 3 | 0x0439 | 0 – 999 | 0.1Hz |
| Input Voltage 3 | 0x043A | 0 – 9999 | 0.1Voltage |
| Input Current 3 | 0x043B | 0 – 9999 | 0.1Amp |
| Input Power 3 | 0x043C | 0 – 65534 | 10 Watt |
| Input Voltage 12 | 0x043D | 0 – 9999 | 0.1Voltage |
| Input Voltage 23 | 0x043E | 0 – 9999 | 0.1Voltage |
| Input Voltage 31 | 0x043F | 0 – 9999 | 0.1Voltage |
| Reserved | 0x0440 | | |
| Reserved | 0x0441 | | |

Output Status

| Description | Address | Value | Unit |
|---------------------|---------|--|------------|
| Output Source | 0x0442 | 0 : Normal 1 : Battery 2 : Bypass(Reserve) 3 : Reducing 4 : Boosting 5 : Manual Bypass 6 : Other 7 : None | |
| Output Frequency | 0x0443 | 0 – 999 | 0.1Hz |
| Output Number Lines | 0x0444 | 0 – 9 | |
| Output Voltage 1 | 0x0445 | 0 – 9999 | 0.1Voltage |
| Output Current 1 | 0x0446 | 0 – 9999 | 0.1Amp |
| Output Power 1 | 0x0447 | 0 –65534 | 10 Watt |
| Output Load1 | 0x0448 | 0 – 999 | % |
| Output Voltage 2 | 0x0449 | 0 – 9999 | 0.1Voltage |

| | | | |
|-------------------|--------|-----------|------------|
| Output Current 2 | 0x044A | 0 – 9999 | 0.1Amp |
| Output Power 2 | 0x044B | 0 – 65534 | 10 Watt |
| Output Load 2 | 0x044C | 0 – 999 | % |
| Output Voltage 3 | 0x044D | 0 – 9999 | 0.1Voltage |
| Output Current 3 | 0x044E | 0 – 9999 | 0.1Amp |
| Output Power 3 | 0x044F | 0 – 65534 | 10 Watt |
| Output Load 3 | 0x0450 | 0 – 999 | % |
| Output Voltage 12 | 0x0451 | 0 – 9999 | 0.1Voltage |
| Output Voltage 23 | 0x0452 | 0 – 9999 | 0.1Voltage |
| Output Voltage 31 | 0x0453 | 0 – 9999 | 0.1Voltage |
| Reserved | 0x0454 | | |
| Reserved | 0x0455 | | |

Bypass Status

| Description | Address | Value | Unit |
|---------------------|---------|-----------|------------|
| Bypass Frequency | 0x0456 | 0 – 999 | 0.1Hz |
| Bypass Number Lines | 0x0457 | 0 – 9 | |
| Bypass Voltage 1 | 0x0458 | 0 – 9999 | 0.1Voltage |
| Bypass Current 1 | 0x0459 | 0 – 9999 | 0.1Amp |
| Bypass Power 1 | 0x045A | 0 – 65534 | 10 Watt |
| Bypass Voltage 2 | 0x045B | 0 – 9999 | 0.1Voltage |
| Bypass Current 2 | 0x045C | 0 – 9999 | 0.1Amp |
| Bypass Power 2 | 0x045D | 0 – 65534 | 10 Watt |
| Bypass Voltage 3 | 0x045E | 0 – 9999 | 0.1Voltage |
| Bypass Current 3 | 0x045F | 0 – 9999 | 0.1Amp |
| Bypass Power 3 | 0x0460 | 0 – 65534 | 10 Watt |
| Bypass Voltage 12 | 0x0461 | 0 – 9999 | 0.1Voltage |
| Bypass Voltage 23 | 0x0462 | 0 – 9999 | 0.1Voltage |
| Bypass Voltage 31 | 0x0463 | 0 – 9999 | 0.1Voltage |

| | | | |
|------------------------|--------|---------|----------------|
| Bypass STS Temperature | 0x0464 | 0 - 999 | Degree Celsius |
| Reserved | 0x0465 | | |
| Reserved | 0x0466 | | |

Test Status

| Description | Address | Value | Unit |
|-------------|---------|---|------|
| Test Result | 0x0467 | 0 : No Test Performed 1 : Test Passed 2 : Test in Progress 3 : General Test Fault 4 : Battery Test Fault 5 : Deep Battery Test Fault 6 : Test Aborted | |

Output Relay

| Description | Address | Value | Unit |
|------------------------|---------|--|------|
| Number of Output Relay | 0x0468 | 0 : Not Available > 0 : Available(<=99) | |

Environment

| Description | Address | Value | Unit |
|-------------|---------|-------------------|----------------|
| Temperature | 0x0469 | 0 – 999 | Degree Celsius |
| Humidify | 0x046A | 0 – 999 | |
| Relay 1 | 0x046B | 0 : Off 1 : On | |
| Relay 2 | 0x046C | 0 : Off 1 : On | |
| Relay 3 | 0x046D | 0 : Off 1 : On | |
| Relay 4 | 0x046E | 0 : Off 1 : On | |
| Reserved | 0x046F | | |
| Reserved | 0x0470 | | |

Select Voltage

| Description | Address | Value | Unit |
|-------------------------|---------|---------|---------|
| Selected Output Voltage | 0x0471 | 0 – 999 | Voltage |
| Select Output Voltage1 | 0x0472 | 0 – 999 | Voltage |
| Select Output Voltage2 | 0x0473 | 0 – 999 | Voltage |
| Select Output Voltage3 | 0x0474 | 0 – 999 | Voltage |

SRAM EXIST

| Description | Address | Value | Unit |
|-------------|---------|------------------------------|------|
| SRAM EXIST | 0x0475 | 0 : Not Exist 1 : Existed | |

Remark: Currently, this field is not supported by UPS

TempStatus

| Description | Address | Value | Unit |
|-----------------------|---------|----------------------|------|
| TempStatus Byte 1,2 | 0x0476 | Lo: Byte1, Hi: Byte2 | |
| TempStatus Byte 3,4 | 0x0477 | | |
| TempStatus Byte 5,6 | 0x0478 | | |
| TempStatus Byte 7,8 | 0x0479 | | |
| TempStatus Byte 9,10 | 0x047A | | |
| TempStatus Byte 11,12 | 0x047B | | |
| TempStatus Byte 13,14 | 0x047C | | |
| TempStatus Byte 15,16 | 0x047D | | |
| TempStatus Byte 17,18 | 0x047E | | |
| TempStatus Byte 19,20 | 0x047F | | |
| Reserved | 0x0480 | | |
| Reserved | 0x0481 | | |

Temp Byte1(Lo) : R Phase Inverter Temperature

Temp Byte2(Hi): B0: Temperature Warning($\geq 75^{\circ}\text{C}$)

B1: High Temperature Shutdown($\geq 85^{\circ}\text{C}$)

B2: Inverter Voltage too Low

B3: Inverter Voltage too High

B4: Overload Warning

B5: Overload Shutdown

B6: Inverter Fuse Fail Shutdown

B7: Inv. PCB communication abnormal

Temp Byte3(Lo): S Phase Inverter Temperature

Temp Byte4(Hi): B0: Temperature Warning($\geq 75^{\circ}\text{C}$)

B1: High Temperature Shutdown($\geq 85^{\circ}\text{C}$)

B2: Inverter Voltage too Low

B3: Inverter Voltage too High

B4: Overload Warning

B5: Overload Shutdown

B6: Inverter Fail Shutdown

B7: Parallel Communication Abnormal

Temp Byte5(Lo): T Phase Inverter Temperature

Temp Byte6(Hi): B0: Temperature Warning($\geq 75^{\circ}\text{C}$)
B1: High Temperature Shutdown($\geq 85^{\circ}\text{C}$)
B2: Inverter Voltage too Low
B3: Inverter Voltage too High
B4: Overload Warning
B5: Overload Shutdown
B6: Inverter Freq. Abnormal Shutdown
B7: Parallel Communication Fail

Temp Byte7(Lo): B3 .. B0: The Summary of UPS Run at Inverter Test Mode
B7 .. B4: The Summary of UPS Run at Inverter Mode

Temp Byte8(Hi): B0: Power Fail
B1: EPO Happen
B2: MB_ON(To Bypass)
B3: Battery Low Warning
B4: Battery Low Shutdown
B5: Master UPS(Output Sync)
B6: Inverter DC Bus Abnormal Shutdown
B7: Short Circuit Happen Shutdown

Temp Byte9(Lo): Heatsink Temperature

Temp Byte10(Hi): B0: Bypass Voltage Over
B1: Bypass Voltage Under
B2: Bypass Freq. Abnormal
B3: Bypass Phase Abnormal
B4: Rectifier Voltage Over
B5: Rectifier Voltage Under
B6: Rectifier Freq. Abnormal
B7: Rectifier Phase Abnormal

Temp Byte11(Lo): Ambient Temperature

Temp Byte12(Hi): B0: Bypass Voltage Over
B1: Bypass Voltage Under
B2: SSW at Bypass Side
B3: SSW at Inverter Side
B4: Rectifier Voltage Over
B5: Rectifier Voltage Under
B6: Rectifier Input Over Current
B7: Rectifier Input Current Unbalance

Temp Byte13(Lo): Battery Temperature

Temp Byte14(Hi): B0: Bypass Voltage Over

B1: Bypass Voltage Under
B2: Low Battery Shutdown
B3: Low Battery Warning
B4: Rectifier Voltage Over
B5: Rectifier Voltage Under
B6: Rectifier Fail
B7: DC Bus Over Voltage

Temp Byte15(Lo): B0: TR1 Over Temperature(O/P TR Over Heat Shutdown)
B1: TR2 Input Choke Over Heat(I/P TR Over Heat Shutdown)
B2: Rectifier Over Temperature Warning($\geq 75^{\circ}\text{C}$)
B3: Rectifier Over Temperature Shutdown($\geq 85^{\circ}\text{C}$)
B4: Static Switch Over Temperature Warning($\geq 75^{\circ}\text{C}$)
B5: Static Switch Over Temperature Shutdown($\geq 85^{\circ}\text{C}$)
B6: Static Switch Overload
B7: Static Switch Fail

Temp Byte16(Hi): B0: Converter Board Power Abnormal
B1: EPO Happen
B2: Manual Bypass On
B3: Converter Board Communication Error

B4: Battery Cabinet Over Temperature Warning($\geq 75^{\circ}\text{C}$)

B5: Battery Ground Fault

B6: Battery Test in Progress

B7: Battery Test Fail

Temp Byte17: Reserved

Temp Byte18: Reserved

Temp Byte19: Reserved

Temp Byte20(Hi): B5: Ambiance Over Temperature

B7: Auxiliary Power Fail

Remark:

1. Currently, TempStatus is not supported by UPS

Parallel Master ID

| Description | Address | Value | Unit |
|--------------------|---------|--------|------|
| Parallel Master ID | 0x0482 | 0 - 99 | |

Available Event Log

| Description | Address | Value | Unit |
|-------------------------|---------|---------|------|
| UPS Event Log | 0x0483 | 0 – 500 | |
| Event Log Report Format | 0x0484 | 0 - 1 | |
| Event Reporting Method | 0x0485 | 0 - 1 | |

Event Log Report Format: 0: NT 9 byte format
1: NH 8 byte format

Power Module Attribute

| Description | Address | Value | Unit |
|---------------------------|---------|----------------------------|------|
| Power Module ID/Attribute | 0x0486 | Lo: ID(1-4), Hi: Attribute | |
| Power Module ID/Attribute | 0x0487 | | |
| Power Module ID/Attribute | 0x0488 | | |
| Power Module ID/Attribute | 0x0489 | | |
| Reserved | 0x048A | | |
| Reserved | 0x048B | | |

Power Module Attribute: which is used to identify the attribute of the power module.

B0: PFC

B1: Rectifier

B2: Charger

B3: Inverter

B4: Bypass

B5: TBD

B6: TBD

B7: TBD

Power Module General Status

| Description | Address | Value | Unit |
|---------------------------------|---------|-------------------------|------|
| Power Module ID/ General Status | 0x048C | Lo: ID(1-4), Hi: Status | |
| Power Module ID/ General Status | 0x048D | | |
| Power Module ID/ General Status | 0x048E | | |
| Power Module ID/ General Status | 0x048F | | |
| Reserved | 0x0490 | | |
| Reserved | 0x0491 | | |

Power Module General Status:

B0: The power module exist or the power module is powered

B1:

B2:

B3:

B4:

B5:

B6:

B7: Fault shutdown

Power Module PFC Status

| Description | Address | Value | Unit |
|-----------------|---------|----------------------------|------|
| Power Module ID | 0x0492 | 1-4 | |
| PFC Status 0,1 | 0x0493 | Lo: Status 0, Hi: Status 1 | |
| Power Module ID | 0x0494 | | |
| PFC Status 0,1 | 0x0495 | | |
| Power Module ID | 0x0496 | | |
| PFC Status 0,1 | 0x0497 | | |
| Power Module ID | 0x0498 | | |
| PFC Status 0,1 | 0x0499 | | |
| Reserved | 0x049A | | |
| Reserved | 0x049B | | |
| Reserved | 0x049C | | |
| Reserved | 0x049D | | |

PFC Status:

B0: PFC fuse open shutdown

B1: PFC over temperature warning

B2: PFC over temperature shutdown

- B3: DC bus over voltage warning
- B4: DC bus over voltage shutdown
- B5: DC bus under voltage warning
- B6: DC bus under voltage shutdown
- B7: PFC circuit general fault
- B8: Fan failure
- B9: TBD
- B10: TBD
- B11: TBD
- B12: Inner communication failure
- B13: TBD
- B14: TBD
- B15: Not calibrated (used to indicate whether the power module has been calibrated)

Power Module Inverter Status

| Description | Address | Value | Unit |
|--------------------------|---------|----------------------------|------|
| Power Module ID/Status 0 | 0x049E | Lo: ID(1-4), Hi: Status 0 | |
| Inverter Status 1,2 | 0x049F | Lo: Status 1, Hi: Status 2 | |
| Power Module ID/Status 0 | 0x04A0 | | |
| Inverter Status 1,2 | 0x04A1 | | |
| Power Module ID/Status 0 | 0x04A2 | | |
| Inverter Status 1,2 | 0x04A3 | | |
| Power Module ID/Status 0 | 0x04A4 | | |
| Inverter Status 1,2 | 0x04A5 | | |
| Reserved | 0x04A6 | | |
| Reserved | 0x04A7 | | |
| Reserved | 0x04A8 | | |
| Reserved | 0x04A9 | | |

Inverter Status:

B0: Inverter fuse open

B1: Inverter over temperature warning

B2: Inverter over temperature shutdown

B3: Fan failure

B4:

B5: Inverter short circuit

B6: Inverter STS failure

B7: Inverter voltage abnormal

B8: Inverter circuit general fault

B9: DC bus over voltage shutdown

B10: Inverter overload

B11:

B12: Inner communication loss (includes the comm. to system or other modules)

B13: EPO shutdown

B14: Inverter parallel communication loss

B15: Inverter parallel failure (which may due to any of ID, or rating setting conflict,
etc...)

B16: TBD

B17: TBD

B18: TBD

B19: TBD

B20: TBD

B21: TBD

B22: TBD

B23: Not calibrated (used to indicate whether the power module has been calibrated)

Power Module Charger Status

| Description | Address | Value | Unit |
|---------------------------------|---------|-------------------------|------|
| Power Module ID/ Charger Status | 0x04AA | Lo: ID(1-4), Hi: Status | |
| Power Module ID/ Charger Status | 0x04AB | | |
| Power Module ID/ Charger Status | 0x04AC | | |
| Power Module ID/ Charger Status | 0x04AD | | |
| Reserved | 0x04AE | | |
| Reserved | 0x04AF | | |

Charger Status:

B0: Charger circuit general fault

B1-B7: Reserved

Power Module Temperature Status

| Description | Address | Value | Unit |
|-------------------|---------|----------|------------|
| Power Module ID | 0x04B0 | 1 - 4 | |
| Temperature PFC | 0x04B1 | 0 – 9999 | 0.1Voltage |
| Temperature TBD | 0x04B2 | 0 – 9999 | 0.1Voltage |
| Temperature INV | 0x04B3 | 0 – 9999 | 0.1Voltage |
| Temperature INV R | 0x04B4 | 0 – 9999 | 0.1Voltage |
| Temperature INV S | 0x04B5 | 0 – 9999 | 0.1Voltage |
| Temperature INV T | 0x04B6 | 0 – 9999 | 0.1Voltage |
| Power Module ID | 0x04B7 | 1 - 4 | |
| Temperature PFC | 0x04B8 | 0 – 9999 | 0.1Voltage |
| Temperature TBD | 0x04B9 | 0 – 9999 | 0.1Voltage |
| Temperature INV | 0x04BA | 0 – 9999 | 0.1Voltage |
| Temperature INV R | 0x04BB | 0 – 9999 | 0.1Voltage |
| Temperature INV S | 0x04BC | 0 – 9999 | 0.1Voltage |
| Temperature INV T | 0x04BD | 0 – 9999 | 0.1Voltage |
| Power Module ID | 0x04BE | 1 - 4 | |

| | | | |
|-------------------|--------|----------|------------|
| Temperature PFC | 0x04BF | 0 – 9999 | 0.1Voltage |
| Temperature TBD | 0x04C0 | 0 – 9999 | 0.1Voltage |
| Temperature INV | 0x04C1 | 0 – 9999 | 0.1Voltage |
| Temperature INV R | 0x04C2 | 0 – 9999 | 0.1Voltage |
| Temperature INV S | 0x04C3 | 0 – 9999 | 0.1Voltage |
| Temperature INV T | 0x04C4 | 0 – 9999 | 0.1Voltage |
| Power Module ID | 0x04C5 | 1 - 4 | |
| Temperature PFC | 0x04C6 | 0 – 9999 | 0.1Voltage |
| Temperature TBD | 0x04C7 | 0 – 9999 | 0.1Voltage |
| Temperature INV | 0x04C8 | 0 – 9999 | 0.1Voltage |
| Temperature INV R | 0x04C9 | 0 – 9999 | 0.1Voltage |
| Temperature INV S | 0x04CA | 0 – 9999 | 0.1Voltage |
| Temperature INV T | 0x04CB | 0 – 9999 | 0.1Voltage |
| Reserved | 0x04CC | | |
| Reserved | 0x04CD | | |
| Reserved | 0x04CE | | |
| Reserved | 0x04CF | | |

| | | | |
|----------|--------|--|--|
| Reserved | 0x04D0 | | |
| Reserved | 0x04D1 | | |
| Reserved | 0x04D2 | | |
| Reserved | 0x04D3 | | |
| Reserved | 0x04D4 | | |
| Reserved | 0x04D5 | | |
| Reserved | 0x04D6 | | |
| Reserved | 0x04D7 | | |
| Reserved | 0x04D8 | | |
| Reserved | 0x04D9 | | |

Power Module Inverter Voltage

| Description | Address | Value | Unit |
|--------------------|---------|----------|------------|
| Power Module ID | 0x04DA | 1 – 4 | |
| Inverter Voltage R | 0x04DB | 0 – 9999 | 0.1Voltage |
| Inverter Voltage S | 0x04DC | 0 – 9999 | 0.1Voltage |
| Inverter Voltage T | 0x04DD | 0 – 9999 | 0.1Voltage |
| Power Module ID | 0x04DE | 1 – 4 | |
| Inverter Voltage R | 0x04DB | 0 – 9999 | 0.1Voltage |
| Inverter Voltage S | 0x04DC | 0 – 9999 | 0.1Voltage |
| Inverter Voltage T | 0x04DD | 0 – 9999 | 0.1Voltage |
| Power Module ID | 0x04DE | 1 – 4 | |
| Inverter Voltage R | 0x04DF | 0 – 9999 | 0.1Voltage |
| Inverter Voltage S | 0x04E0 | 0 – 9999 | 0.1Voltage |
| Inverter Voltage T | 0x04E1 | 0 – 9999 | 0.1Voltage |
| Power Module ID | 0x04E2 | 1 – 4 | |
| Inverter Voltage R | 0x04E3 | 0 – 9999 | 0.1Voltage |

| | | | |
|--------------------|--------|----------|------------|
| Inverter Voltage S | 0x04E4 | 0 – 9999 | 0.1Voltage |
| Inverter Voltage T | 0x04E5 | 0 – 9999 | 0.1Voltage |
| Power Module ID | 0x04E6 | 1 – 4 | |
| Inverter Voltage R | 0x04E7 | 0 – 9999 | 0.1Voltage |
| Inverter Voltage S | 0x04E8 | 0 – 9999 | 0.1Voltage |
| Inverter Voltage T | 0x04E9 | 0 – 9999 | 0.1Voltage |
| Reserved | 0x04EA | | |
| Reserved | 0x04EB | | |
| Reserved | 0x04EC | | |
| Reserved | 0x04ED | | |
| Reserved | 0x04EE | | |
| Reserved | 0x04EF | | |
| Reserved | 0x04F0 | | |
| Reserved | 0x04F1 | | |

Battery Cabinet Temperature

| Description | Address | Value | Unit |
|--------------------------------|---------|---------|----------------|
| Battery Cabinet #1 Temperature | 0x04F2 | 0 – 999 | Degree Celsius |
| Battery Cabinet #2 Temperature | 0x04F3 | 0 – 999 | Degree Celsius |
| Battery Cabinet #3 Temperature | 0x04F4 | 0 – 999 | Degree Celsius |
| Battery Cabinet #4 Temperature | 0x04F5 | 0 - 999 | Degree Celsius |
| Reserved | 0x04F6 | | |
| Reserved | 0x04F7 | | |

Manufacture

| Description | Address | Value | Unit |
|-------------------------|---------|-------------------------|------|
| Manufacture Byte 0, 1 | 0x04F8 | Lo: Byte0, Hi: Byte 1 | |
| Manufacture Byte 2, 3 | 0x04F9 | Lo: Byte2, Hi: Byte 3 | |
| Manufacture Byte 4, 5 | 0x04FA | Lo: Byte4, Hi: Byte 5 | |
| Manufacture Byte 6, 7 | 0x04FB | Lo: Byte6, Hi: Byte 7 | |
| Manufacture Byte 8, 9 | 0x04FC | Lo: Byte8, Hi: Byte 9 | |
| Manufacture Byte 10, 11 | 0x04FD | Lo: Byte10, Hi: Byte 11 | |
| Manufacture Byte 12, 13 | 0x04FE | Lo: Byte12, Hi: Byte 13 | |
| Manufacture Byte 14, 15 | 0x04FF | Lo: Byte14, Hi: Byte 15 | |
| Reserved | 0x0500 | | |
| Reserved | 0x0501 | | |
| Reserved | 0x0502 | | |

Model

| Description | Address | Value | Unit |
|-------------------|---------|-------------------------|------|
| Model Byte 0, 1 | 0x0503 | Lo: Byte0, Hi: Byte 1 | |
| Model Byte 2, 3 | 0x0504 | Lo: Byte2, Hi: Byte 3 | |
| Model Byte 4, 5 | 0x0505 | Lo: Byte4, Hi: Byte 5 | |
| Model Byte 6, 7 | 0x0506 | Lo: Byte6, Hi: Byte 7 | |
| Model Byte 8, 9 | 0x0507 | Lo: Byte8, Hi: Byte 9 | |
| Model Byte 10, 11 | 0x0508 | Lo: Byte10, Hi: Byte 11 | |
| Model Byte 12, 13 | 0x0509 | Lo: Byte12, Hi: Byte 13 | |
| Model Byte 14, 15 | 0x050A | Lo: Byte14, Hi: Byte 15 | |
| Reserved | 0x050B | | |
| Reserved | 0x050C | | |
| Reserved | 0x050D | | |

Firmware Version

| Description | Address | Value | Unit |
|------------------------------|---------|-------------------------|------|
| Firmware Version Byte 0, 1 | 0x050E | Lo: Byte0, Hi: Byte 1 | |
| Firmware Version Byte 2, 3 | 0x050F | Lo: Byte2, Hi: Byte 3 | |
| Firmware Version Byte 4, 5 | 0x0510 | Lo: Byte4, Hi: Byte 5 | |
| Firmware Version Byte 6, 7 | 0x0511 | Lo: Byte6, Hi: Byte 7 | |
| Firmware Version Byte 8, 9 | 0x0512 | Lo: Byte8, Hi: Byte 9 | |
| Firmware Version Byte 10, 11 | 0x0513 | Lo: Byte10, Hi: Byte 11 | |
| Firmware Version Byte 12, 13 | 0x0514 | Lo: Byte12, Hi: Byte 13 | |
| Firmware Version Byte 14, 15 | 0x0515 | Lo: Byte14, Hi: Byte 15 | |
| Reserved | 0x0516 | | |
| Reserved | 0x0517 | | |
| Reserved | 0x0518 | | |

CPU

| Description | Address | Value | Unit |
|---------------|---------|-----------------------|------|
| CPU Byte 0, 1 | 0x0519 | Lo: Byte0, Hi: Byte 1 | |
| CPU Byte 2, 3 | 0x051A | Lo: Byte2, Hi: Byte 3 | |
| Reserved | 0x051B | | |

UPS Connection Status

| Description | Address | Value | Unit |
|-----------------------|---------|---------------------------------|------|
| UPS Connection Status | 0x051C | 0:Disconnection 1:Connection | |

Remark:

1. Filed value 0xFFFF in Input Registers represents that field is not supported by UPS